PB-213 379

REFERENCES FOR THE IDENTIFICATION OF FRESHWATER MACROINVERTEBRATES

Philip A. Lewis

National Environmental Research Center
Cincinnati, Ohio

October 1972

DISTRIBUTED BY:

NTIS

National Technical Information Service
U. S. DEPARTMENT OF COMMERCE
5285 Port Royal Road, Springfield Va. 22151

EPA-R4-72-006
October 1972

Environmental Monitoring Series

PB 213 379

References for the Identification of Freshwater Macroinvertebrates

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
U S Department of Commerce
Springfield VA 22151

National Environmental Research Center
Office of Research and Monitoring
U.S. Environmental Protection Agency
Cincinnati, Ohio 45268

R 23

BIBLIOGRAPHIC DATA SHEET	1. Report No. EPA-R4-72-006	2.	3. Recipient's Accession No. PB-213 374
4. Title and Subtitle References for the Identification of Freshwater Macroinvertebrates			5. Report Date October 1972 6.
7. Author(s) Philip A. Lewis			8. Performing Organization Rept. No.
9. Performing Organization Name and Address U.S. Environmental Protection Agency National Environmental Research Center Office of Research & Monitoring Cincinnati, Ohio 45268			10. Program Element B11027 11. Contract/Grant No.
12. Sponsoring Organization Name and Address			13. Type of Report & Period Covered 14.

15. Supplementary Notes

16. Abstracts

As part of the research work involved in protecting the environment, macroinvertebrates are used as indicators of freshwater pollution. The references included in this bibliography were chosen as being particularly pertinent to aid the field and laboratory scientist and the student identify these important organisms.

17. Key Words and Document Analysis. 17a. Descriptors

*Bibliographies, *Indicator species, Aquatic biology, Pollution, *Freshwater, Invertebrates, Annelida, Arthropoda, Crustacea, Bryozoa, Mollusca, Platyhelminthes

17b. Identifiers/Open-Ended Terms

*Macroinvertebrates, *Indicators, *Freshwater pollution

17c. COSATI Field/Group 06 03, 06 06 and 06 11

18. Availability Statement	19. Security Class (This Report)	21. No. of Pages
Release to public	UNCLASSIFIED	23
	20. Security Class (This Page) UNCLASSIFIED	22. Price $3.00/$0.95

FORM NTIS-35 (REV. 3-72) THIS FORM MAY BE REPRODUCED USCOMM-DC 14952-P72

EPA-R4-72-006
October 1972

REFERENCES FOR THE IDENTIFICATION OF FRESHWATER MACROINVERTEBRATES

Philip A. Lewis
Analytical Quality Control Laboratory
Cincinnati, Ohio 45268

Program Element No. B11027

-ib-

NATIONAL ENVIRONMENTAL RESEARCH CENTER
OFFICE OF RESEARCH AND MONITORING
U.S. ENVIRONMENTAL PROTECTION AGENCY
CINCINNATI, OHIO 45268

REVIEW NOTICE

The Solid Waste Research Laboratory of the National Environmental Research Center, Cincinnati, U.S. Environmental Protection Agency, has reviewed this report and approved its publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

FOREWORD

Man and his environment must be protected from the adverse effects of pesticides, radiation, noise and other forms of pollution, and the unwise management of solid waste. Efforts to protect this environment require a focus that recognizes the interplay between the components of our physical environment - air, water and land. The multidisciplinary programs of the National Environmental Research Centers provide this focus as they engage in studies of the effects of environmental contaminants on man and the biosphere and in a search for ways to prevent contamination and recycle valuable resources.

As part of the research work involved in these protection efforts, macroinvertebrates are used as indicators of freshwater pollution. The references included in this bibliography were chosen as being particularly pertinent to aid the field and laboratory scientist and the student identify these important organisms.

ANDREW W. BREIDENBACH, Ph.D.
Director, National Environmental
Research Center, Cincinnati

TABLE OF CONTENTS

	Page
Annelida	
Oligochaeta	1
Hirudinea	1
Arthropoda	
Insecta	
Coleoptera	2
Diptera: Chaoboridae	2
Diptera: Chironomidae	2
Diptera: Other	6
Ephemeroptera	6
Hemiptera	8
Megaloptera - Neuroptera	8
Odonata	9
Plecoptera	10
Trichoptera	11
Crustacea	13
Bryozoa	14
Mollusca	14
Platyhelminthes	
Turbellaria	15
Minor Taxa	16
General References	16

Preceding page blank

ANNELIDA

Oligochaeta

Brinkhurst, R. O. 1964, 1965, and 1966. Studies on the North American aquatic Oligochaeta. Proc. Acad. Nat. Sci. Phila. Part I, 1964, 116(5):195-230; Part II, 1965, 117(4):117-172; Part III, 1966, 118(1):1-33.

_____. 1969. Oligochaeta. In: Keys to water quality indicative organisms. (S. E. United States), FWPCA, Atlanta, Georgia.

_____. A. L. Hamilton, and H. B. Herrington. 1968. Components of the bottom fauna of the St. Lawrence, Great Lakes. Great Lakes Research Institute #PR 33.

_____and B. G. Jamieson. 1971. Oligochaeta of the world. Oxford Press, N.Y.

Galloway, T. W. 1911. The common fresh-water Oligochaeta of the U. S. Trans. Amer. Microsc. Soc. 29-30:285-317.

Harmon, W. J. 1969. Revision of the family Opistocystidae (Oligochaeta). Trans. Amer. Microsc. Soc. 88(4):472-478.

Hiltunen, J. K. 1967. Some Oligochaetes from Lake Michigan. Trans. Amer. Microsc. Soc. 86(4):433-454.

_____. 1970. Trial key to the Tubificidae of the Great Lakes Region. Great Lakes Fish. Lab., Ann Arbor, Mich.

Hirudinea

Meyer, M. C. 1940. A revision of the leeches living on freshwater fishes of North America. Trans. Amer. Microsc. Soc. 59:354-376.

_____and J. P. Moore. 1954. Notes on Canadian leeches with the description of a new species. Wasmann J. Biol. 12(1):63-95.

_____and M. C. Miller. 1951. Leeches (Hirudinea) from Alaska and adjacent waters. Wasmann J. Biol. 9:11-77.

Miller, J. A. 1937. A study of the leeches of Michigan with keys to orders, suborders, and species. Ohio J. Sci. 37:85-90.

Moore, J. P. 1898. The Hirudinea of Illinois. Ill. Lab Nat. Hist. Surv. Bull. 5:479-546.

Pennak, R. W. 1953. Fresh-water invertebrates of the United States. Ronald Press Co., N.Y.

Scott, J. H. 1970. Systematics, distribution and ecology of Colorado Hirudinea. Am. Midl. Nat. 83(1):1-37.

Soos, A. 1965 and 1966. Identification key to the leech genera of the world, with a catalogue of the species. (Parts I, II, and III) Acta Zool. Acad. Sci. Hung. 11:417-463, 12:145-160, 371-407.

_____. 1912. The leeches of Minnesota. Zool. Ser. Geol. Surv. Minn. 5:63-143.

ARTHROPODA

INSECTA

Coleoptera

Hinton, H. E. 1941. New genera and species of Elmidae. Trans. Roy. Ent. Soc. Lond. 91(3):65-104.

Sanderson, M. W. 1938. A monographic revision of the North American species of Stenelmis (Dryopidae: Coleoptera). Univ. Kans. Sci. Bull. 25(22):635-717.

Sinclair, R. M. 1964. Water quality requirements of the family Elmidae (Coleoptera) with keys to the larvae and adults of the eastern genera. Tenn. Stream Pollution Control Board, Tenn. Dept. Public Health.

Diptera: Chaoboridae

Saether, O. A. 1970. Nearctic and palaearctic Chaoborus. Fish. Res. Bd. Can. Bull. 174-1-58.

Diptera: Chironomidae

Beck, E. C. 1962. Five new Chironomidae (Diptera) from Florida. Fla. Ent. 45(2):89-92.

Beck, E. C. and W. M. Beck, Jr. 1969. The Chironomidae of Florida. II. The nuisance species. Fla. Ent. 52(1):1-11.

_____ and _____. 1969. Chironomidae of Florida. III. The Harnischia complex. Bull. Fla. St. Mus. 13(5): 277-313.

Beck, W. M., Jr. 1968. Chironomidae. In: Keys to water quality indicative organisms of the S. E. United States. FWPCA Atlanta, Georgia.

Beck, W. M., Jr. and E. C. Beck. 1958. A new species of Xenochironomus from Florida (Diptera:Chironomidae). Fla. Ent. 41(1):27 & 28.

_____. 1966. Chironomidae (Diptera) of Florida. I. Pentaneurini (Tanypodinae). Bull. Fla. St. Mus., 10(8):305-379.

_____. 1970. The immature stages of some Chironomini (Chironomidae). Quart. Jour. Florida Acad. Sci. 33(1): 29-42.

Brundin, L. 1959. Key to the Northern European genera of Orthocladiinae. From: Zur Systematik der Orthocladiinae. Report No. 37 of the Institute of Freshwater Research, Drottingholm, Sweden.

Curry, L. L. 1958. Larvae and pupae of the species of Cryptochironomus in Michigan. Limnol. and Oceanogr. 3(4):427-442.

_____. 1962. A key for the larval forms of aquatic midges (Tendipedidae: Diptera) of Michigan. Rept. #1 of NIH contract "A study of the ecology & taxonomy of freshwater midges (Diptera: Tendipedidae) of Michigan with special reference to their role in the "turnover" of radioactive substances in the hydrosol. Central Mich. Univ. 149 pp. (out of print).

Darby, R. E. 1962. Midges associated with Calif. rice fields, with special reference to their ecology. (Diptera: Chironomidae). Hilgardia 32(1):1-206.

Dendy, J. S. and J. E. Sublette. 1959. The Chironomidae of Alabama with descriptions of six new species. Ann. Ent. Soc. Amer. 52(5):506-519.

Freeman, P. 1955. A study of African Chironomidae. Bull. Br. Mus. Ent. 4:1-363.

Frommer, S. 1967. Review of the anatomy of adult Chironomidae. Calif. Mosquito Control Assoc. Tech. Series Bull. No. 1:1-40 + 30 plates.

Grodhaus, G. 1967. Identification of chironomid midges commonly associated with waste stabilization lagoons in Calif. Calif. Vector Views 14(1):1-12.

Hamilton, A. L., O. A. Saether, and D. R. Oliver. 1969. A classification of the nearctic Chironomidae. Fish. Res. Bd. Can. Tech. Rpt. No. 124:1-42.

Hilsenhoff, W. L. and R. P. Narf. 1968. Ecology of Chironomidae, Chaoboridae, and other benthos in fourteen Wisconsin Lakes. Ann. Ent. Soc. Amer. 61(5):1173-1181.

*Johannsen, O. A. 1934. Aquatic Diptera. Part I. Nemocera, exclusive of Chironomidae and Ceratopogonidae. Mem. Cornell Univ. Agric. Exp. Sta. 164:1-70.

*_____. 1935. Aquatic Diptera. Part II. Orthorrhapha-Brachycera and Cyclorrhapha. Ibid. 177:1-62.

*_____. 1937. Aquatic Diptera. Part III. Chironomidae: Subfamilies Tanypodinae, Diamesinae, and Orthocladiinae. Ibid. 205:1-84.

*_____. 1937a. Aquatic Diptera. Part IV. Chironomidae: Subfamily Chironominae. Ibid. 210:1-56.

_____. 1946. Revision of the North American species of the genus Pentaneura. J. New York Ent. Soc. 54:270-289.

_____and H. K. Townes. 1952. Guide to the insects of Connecticut. Part VI. The Diptera or true flies. Fascicle 5: Midges and gnats. Conn. Geol. and Nat. Hist. Surv. Bull. No. 80:1-235.

Malloch, J. R. 1915. The Chironomidae, or midges of Illinois, with particular reference to the species occurring in the Illinois River. Bull. Ill. State Lab. Nat. Hist. 10 (art. 6:273-590.

Mason, W. T., Jr. 1968. An introduction to the identification of chironomid larvae. FWPCA, U.S. Dept. of Interior, Cincinnati, O.

Roback, S. S. 1953. Savannah River tendipedid larvae. Proc. Acad. Nat. Sci Phila. 105:91-132.

_____. 1957. The immature tendipedids of the Philadelphia Area. Acad. Nat. Sci. Phila. Mono. No. 9. 148 pp.

*Available from Entomological Reprint Specialists, Los Angeles, California 90007.

_____. 1959. The subgenus Ablabesmyia of Pentaneura (Diptera: Tendipedidae, Pelopiinae). Trans. Amer. Ent. Soc. 85:113-135.

_____. 1969. The Immature stages of the genus Tanypus Meigen. Trans. Amer. Ent. Soc. 94:407-428.

_____. 1963. The genus Xenochironomus (Diptera: Tendipedidae) Kieffer, taxonomy and immature stages. Trans. Amer. Ent. Soc. 88:235-245.

_____. 1970. The subfamily Tanypodinae in North America. Monographs of the Acad. Nat. Sci. Phila. No. 17:1-410.

Saether, O. A. 1969. Some nearctic Podonomenae Diamesinae, and Orthocladiinae. Fish. Res. Bd. Can. Bull. 170:1-154.

Sublette, J. E. 1960. Chironomid Midges of California. Part I. Chironominae, exclusive of Tanytarsini (=Calopsectrini). Proc. U.S. Nat. Mus. 112:197-226.

_____. 1964. Chironomidae (Diptera) of Louisiana. I. Systematics and immature stages of some bentic chironomids of West-Central Louisiana. Tulane Studies in Zoology. 11(4):109-150.

_____. 1966. Type specimens of Chironomidae (Diptera) in the American Museum of Natural History. J. Kan. Ent. Soc. 39(1):1-32.

_____. 1966. Type specimens of Chironomidae (Diptera) in the U. S. National Museum. 39(4):580-607.

_____. 1967. Type specimens of Chironomidae (Diptera) in the Canadian National Collection, Ottawa. J. Kan. Ent. Soc. 40(3):290-331.

_____. 1967. Type specimens of Chironomidae (Diptera) in the Cornell Univ. Collection. J. Kan. Ent. Soc. 40(4):477-564.

Sublette, J. E. 1970. Type specimens of Chironomidae (Diptera) in the Illinois Natural History Survey Collection, Urbana. J. Kan. Ent. Soc. 43(1):44-95.

_____and M. S. Sublette. 1965. Family Chironomidae (Tendipedidae). A catalog of Diptera of America north of Mexico. U. S. Dept. Agri. No. 276:143-181.

Thienemann, A. 1954. Chironomus: Leben, Verbreitung und wirtschaftiche Bedeutung der Chironomiden. Die Binnengewasser max-Planck Institut Vol. 20. E. Schweizer-bartsche Verlagsbuchhandlung, Stuttgart 834 pp.

Townes, H. K. 1945. The nearctic species of Tendipendini. Am. Midl. Nat. 34(1):1-206.

Diptera: Other

Carpenter, S. J. 1970. Observations on the distribution and ecology of mountain Aedes mosquitos in California. Calif. Vector News 17(11):101-107.

Coe, R. L., P. Freeman, and P. F. Mattingly. 1950. Handbook for the identification of British Insects: Diptera. Roy. Ent. Soc. Lond. 9(2):1-216.

Johannson, O. A. and H. K. Townes. 1952. Guide to the insects of Connecticut. Part VI. The Diptera or true flies. Bull. Conn. Geol. and Nat. Hist. Surv. 80:1-255.

Oldroyd, H., R. L. Coe, P. Freeman, and P. F. Mattingly. 1949. Handbooks for the identification of British insects: Diptera. Parts 1 and 2. Roy. Ent. Soc. of Lon. 9(1):1-49, (2):1-216.

Stone, A. and E. L. Snoddy. 1969. The blackflies of Alabama. Auburn Univ. Ag. Exp. Station Bull. 390.

Wirth, W. W. 1953. Biting midges of the heleid genus Stilobezzia in North America. Proc. Nat. Mus. 103:57-154.

Ephemeroptera

Allen, R. K. and L. F. Edmunds. 1956. A list of mayflies of Oregon. Utah Acad. of Sci. Proceedings 33:85-87.

Berner, L. 1950. The mayflies of Florida. Univ. Fla. Studies, Biol. Sci. Ser. 4:1-267.

Britt, N. W. 1962. Biology of two species of Lake Erie mayflies, Ephoron album (Say) and Ephemera simulans (Walker). Bull. Ohio Biol. Survey, Columbus 1(5):1-70.

Burks, B. D. 1947. New heptagenine mayflies. Ann. Ent. Soc. Amer. 29:607-615.

_____. 1953. The mayflies, or Ephemeroptera, of Illinois. Bull. Ill. Nat. Hist. Surv. 26:1-216.

Daggy, R. H. 1945. New species and previously undescribed naiads of some Minnesota mayflies. Ann. Ent. Soc. Amer. 38:373-396.

Edmunds, G. F., Jr. 1962. The type localities of the Ephemeroptera of North America north of Mexico. Univ. Utah Biol. Series 12(5):1-45.

_____, R. K. Allen, and W. L. Peters. 1963. An annotated key to the nymphs of the families and subfamilies of mayflies. Univ. Utah Biol. Series 13(1):1-55.

Gooch, V. K. 1967. Identification of Hexagenia bilineata and H. limbata nymphs. Ent. News 78:101-103.

Hilsenhoff, W. L. 1970. Key to genera of Wisconsin Ephemeroptera nymphs. Wisc. Dept. Nat. Resources. Research Rept. 67:19-37.

McDunnough, J. 1933. Notes on the heptagenine species described by Clemens from the Georgian Bay Region, Ont. Can. Ent. 65: 17-24, 33-43.

Murphy, H. E. 1922. Notes on the biology of some of our North American species of mayflies, Part 1: The metamorphosis of mayfly mouth Parts. Part II: Notes on the biology of mayflies of the genus Baetis. Bull. Lloyd Lib. of Bot., Nat. Hist. Phar. and Materia Medica, Cincinnati, Ohio #22(2):1-46 (Out of Print).

Needham, J. G. 1905. Ephemeridae. Bull. N. Y. State Mus. 86: 17-62, 316-324.

_____ and Helen E. Murphy. 1924. Neotropical mayflies. Bull. Lloyd Lib. Bot. Phar., and Materia Medica, Cincinnati, Ohio, No. 24(4):1-79 (Out of Print).

_____, J. R. Traver and Yin-Chi Hsw. 1935. The biology of mayflies. Comstock Pub. Co., Ithaca, N. Y., 759 pp.

Peters, W. L. 1971. A revision of the Leptophlebiidae of the West Indies. Smithsonian Contr. to Zool. No. 62:1-48.

_____ and G. F. Edmunds, Jr. 1970. Revision of the generic classification of the Eastern Hemisphere Leptophlebiidae. Pacific Insects 12(1):157-240.

Schneider, R. F. 1967. Mayfly nymphs from Northwestern Florida. Quart. J. Fla. Acad. Sci. 29(3):202-206.

_____ and L. Berner. 1963. A new Southeastern species of Baetisca (Ephemeroptera: Baetiscidae). Fla. Ent. 46(2): 183-187.

Spieth, H. T. 1947. Taxonomic studies on the Ephemeroptera. IV:The genus Stenonema. Ann. Ent. Soc. Amer. 40:87-122.

Traver, J. R. 1933. Mayflies of North Carolina, Part III. The Heptageninae. J. Elisha Mitchell Sci. Soc. 48(2):141-207.

_____. 1933. Heptagenine mayflies of North America. J. N. Y. Ent. Soc. 41:105-125.

_____. 1937. Notes on mayflies of the Southeastern States. J. Elisha Mitchell Sci. Soc. 53(1):27-87.

_____ and George F. Edmunds, Jr. 1967. A revision of the genus Thraulodes (Leptophlebiidae). Misc. Pub. Ent. Soc. Amer. 5(8):349-402.

_____, and _____. 1968. A revision of the Baetidae with spatulate clawed nymphs. Pacific Insects 10(3-4):629-677.

Hemiptera

Hungerford, H. B. 1948. The Corixidae of the Western Hemisphere. Kans. Univ. Sci. Bull. 32:1-827.

LaRivers, I. 1953. Two new Nancorid bugs of the genus Ambrysus. Proc. U. S. Nat. Mus. 103:1-7.

Megaloptera - Neuroptera

Neunzig, H. H. 1966. Larvae of the genus Nigronia. Banks. Proc. Ent. Soc. Wash. 68(1):11-16.

Parfin, S. I. and A. B. Gurney. 1956. The spongilla-flies with special reference to those of the Western hemisphere. Proc. U.S. Nat. Mus. 105:421-529.

Ross, H. H. 1937. Nearctic alder flies of the genus Sailis. Ill. Nat. Hist. Sur. Bull. 21(3):57-58.

Odonata

Garman, P. 1927. Guide to the insects of Connecticut. Part V. The Odonata or dragonflies of Connecticut. Conn. Geol. Nat. Hist. Surv. 39:1-331

Kennedy, C. H. 1915. Notes on the life history and ecology of the dragonflies (Odonata) of Washington and Oregon. Proc. U. S. Nat. Mus. 49:259-345.

Kormondy, E. J. 1959. The systematics of Tetragoneuria based on ecological life history and morphological evidence (Odonata: Corduliidae). Misc. Publ. Mus. Zool. Univ. Mich. 107:1-79.

Needham, J. G. and M. J. Westfall, Jr. 1954. Dragonflies of North America. Univ. Calif. Press, Berkeley and Los Angeles. 615 pp.

Roback, S. S. and M. J. Westfall, Jr. 1967. New records of Odonata nymphs from the United States and Canada with water quality data. Trans. Amer. Ent. Soc. 93:101-124.

Walker, E. M. 1953 & 1958. The Odonata of Canada and Alaska. Univ. Toronto Press, Toronto, Vols. 1 & 2.

Williamson, E. B. 1899. The dragonflies of Indiana. Indiana Dept. Geol. Nat. Res., 24th Annual Report:229-333.

Wright, M. and A. Peterson. 1944. A key to the genera of Anisopterous dragonfly nymphs of the United States and Canada (Odonata, suborder Anisoptera). Ohio J. Sci. 44:151-166.

Plecoptera

Frison, T. H. 1935. The stoneflies, or Plecoptera of Illinois. Bull. Ill. Nat. Hist. Surv. 20:281-371.

_____. 1942. Studies of North American Plecoptera. Bull. Ill. Nat. Hist. Surv. 22:235-355.

Harden, H. and E. Mickel. 1952. The stoneflies of Minnesota (Plecoptera). Univ. Minn. Agric. Exp. Sta. 201:1-84.

Hilsenhoff, W. L. 1970. Key to genera of Wisconsin Plecoptera (stonefly) nymphs. Wisc. Dept. Nat. Resources. Research Rept. 67:2-18.

Jewett, S. G., Jr. 1954. New stoneflies (Plecoptera) from Western North America. J. Fish. Res. Bd. Canada 11(5):543-549.

_____. 1955. Notes and descriptions concerning Western North American stoneflies (Plecoptera). Wasmann Biol. 13(1):145-154.

_____. 1959. The stoneflies (Plecoptera) of the Pacific Northwest. Oregon State College Press. 95 pp.

_____. 1960. The stoneflies (Plecoptera) of California. Bull. Cal. Ins. Surv. 6(6):125-177.

_____. 1965. Four new stoneflies from California and Oregon (Plecoptera). The Pan-Pac Ent. 41:5-9.

Narf, R. P. 1969. A proposed key to the species of Allocapnia (Plecoptera: Capniidae) males. Wisc. Rept. Nat. Resources.

Nebeker, A. V. 1967. The female of Capnia labradora Richer (Capniidae: Plecoptera) Ent. News. 78(9):225-226.

Nebeker, A. V. and A. R. Gaufin. 1965. The Capnia columbiana complex of North America (Capniidae: Plecoptera). Trans. Amer. Ent. Soc., 91:467-487.

_____and _____. 1966. New Paraleuctra from the Rocky Mountains (Plecoptera: Leuctridae) Ent. News 77(9):256-59.

_____and _____. 1966. New stoneflies from Idaho (Plecoptera). Ent. News 77(2):37-43.

_____and _____. 1967. Geographic and seasonal distribution of the family Capniidae of Western North America (Plecoptera). J. Kan. Ent. Soc. 40:415-421.

_____and _____. 1968. The winter stoneflies of the Rocky Mountains (Plecoptera, Capniidae). Trans. Amer. Ent. Soc. 94:1-24.

Ross, H. H. and T. H. Frison. 1937. Studies of nearctic aquatic insects. Bull. Ill. Nat. Hist. Surv. 21:57-99.

Trichoptera

Flint, O. S. 1960. Taxonomy and biology of nearctic Limnephilid larvae (Trichoptera), with special reference to species in Eastern United States. Entomol. Amer., 40:1-120.

_____. 1964. The caddisflies (Trichoptera) of Puerto Rico. Univ. Puerto Rico Agri. Expt. Sta., Tech. Paper 40, 80 pp.

_____. 1964. Notes on some nearctic Psychomyiidae with special reference to their larvae (Trichoptera). Proc. U. S. Nat. Mus. Publ. No. 3491, 115:467-481.

_____. 1970. Studies of neotropical caddisflies, X:Leucotrichia and related genera from North and Central America. Smithsonian Contr. to Zool. 60:1-64.

Hickin. N. E. 1968. Caddis larvae: Larvae of British Trichoptera. Associated University Press, Cranbury, New Jersey 08512.

Hilsenhoff, W. L. 1970. Key to genera of Trichoptera larvae. Wisc. Dept. Nat. Resources. Research Rpt. 67:38-67.

Lloyd, J. T. 1921. The biology of North American caddisfly larvae. Bull. Lloyd Lib. of Bot., Phar, and Materia Medica #21, Entomological Series 1:16-19.

Ross, H. H. 1941. Descriptions and records of North American Trichoptera. Trans. Amer. Ent. Soc. 67:35-126.

*_____. 1944. The caddisflies, or Trichoptera of Illinois. Bull. Ill. Nat. Hist. Surv. 23:1-326.

_____. 1947. Descriptions and records of North American Trichoptera with synoptic notes. Trans. Amer. Ent. Soc. 73:125-168.

_____. 1971. Hydropsychid genus A. Diplectrona (Trichoptera: Hydropsychidae). J. Ga. Ent. Soc. 5(4):229-231.

Sherberger, F. F. and J. B. Wallace. 1971. Larvae of the Southeastern species of Molanna. J. Kan. Ent. Soc. 44(2):217-224.

Sherberger, F. F. and J. B. Wallace. 1971. Description of the larval stage of Rhyacophila vuphiphes milne (Trichoptera: Rhyacophilidae). J. N. Y. Ent. Soc. 79(1):43&44.

Wallace, J. B. 1970. A new species of Psilotreta from North Carolina (Trichoptera: Odontoceridae)Ent. News 81:243-245.

Wallace, J. B. and H. H. Ross. 1971. Pseudogoerinae: A new subfamily of Odontoceridae(Trichopera). Ann. Ent. Soc. Amer. 64(4):980-894.

Wallace, J. B. and F. F. Sherberger. 1970. The immature stages of Anisocentropus pyraloides (Trichoptera:Calamoceratidae) J. Ga. Ent. Soc. 5(4):217-224.

_____. 1960. A preliminary systematic study of the North American larvae of the caddisflies, Family Phryganeidae (Trichoptera). Can. J. Zool. 38:1153-1170.

*Available from Entomological Reprint Specialists, Los Angeles, California 90007.

Wiggins, G. B. 1961. Records and descriptions of North American species in the genus Lepidostoma, with a revision of the Vernalis Group (Trichoptera:Lepidostomatidae). Can. Ent. 93(8):695-297.

_____. 1961. The rediscovery of an unusual North American Phryganeid, with some additional records of caddisflies from Newfoundland (Trichoptera). Can. Ent. 93(8):695-702.

_____. 1962. A new subfamily of Phryganeid caddisflies from Western North America (Trichoptera: Phryganeidae). Can. J. Zool. 40:879-891.

_____. 1963. Larvae and pupae of two North American Lemnephilid caddisfly genera (Trichoptera:Limnephilidae). Bull. Brook. Ent. Soc. 57(4):103-112.

_____. 1965. Additions and revisions to the genera of North American caddisflies of the family Brachycentridae with special reference to the larval stages (Trichoptera). Can. Ent. 97: 1089-1106.

_____, and N. H. Anderson. 1968. Contributions to the systematics of the caddisfly genera Pseudostenophylax and Philocasca with special reference to the immature stages (Trichoptera: Limnephilidae) Can. J. Zool. 46:61-75.

Yamamoto, T. and G. B. Wiggins. 1964. A comparative study of the North American species in the caddisfly genus Mystacides (Trichoptera:Leptoceridae). Can. J. Zool. 42:1105-1126.

ARTHROPODA

CRUSTACEA

Birstein, Y. A. 1951. Fauna of U.S.S.R.: Crustacea: Freshwater isopods. Zoological Institute of the Academy of Sciences of the U.S.S.R. New Series No. 47 (Translated from Russian by Israel Program for Scientific Translations, available from U. S. Dept. of Commerce, Washington).

Bousfield, E. L. 1958. Fresh-water Amphipod crustaceans of glaciated North America. Can. Field Nat. 72:55-113.

Cole, G. A. 1970. Gammarus minus: Geographic variation and description of new subspecies, G. m. pinicollis (Crustacea: Amphipoda) Trans. Amer. Micros. Soc. 89(4):514-523.

_____, 1970. The epimera of North American fresh-water species of Gammarus (Crustacea:Amphipoda) Biol. Soc. Wash. Proc. 83(31): 333-348.

Crocker, D. W. 1957. The crayfishes of New York State. N.Y. State Mus. & Sic. Service Bull. 355:13-47.

_____, and D. W. Barr. 1968. Handbook of the crayfishes of Ontario. Life Sciences Misc. Publ., U. of Toronto Press.

Francois, D. D. 1959. The crayfishes of New Jersey. Ohio J. of Sci. 59(2):108-127.

Hobbs, H. H., Jr., and C. W. Hart, Jr. 1959. The freshwater decapod Crustaceans of the Apalachicola drainage system in Florida, Southern Alabama, and Georgia. Bull. Fla. St. Mus. Biol. Sic. 4(5):145-191.

Holsinger, J. R. 1967. Systematics, speciation, and distribution of the subterranean amphipod genus Stygonectes (Gammaridae). U. S. Nat. Mus. Bull. #259:1-176.

Mackin, J. G. 1949. The freshwater isopods of the genus Lirceus (Asellota:Asellidae). Am. Midl. Nat. 42:334-349.

Ortman, A. E. 1931. Crawfishes of the Southern Appalachians and the Cumberland Plateau. Ann. Carnegie Mus., 20(2):61-160.

Rhoades, R. 1944. Crayfishes of Kentucky, with notes on variation, distribution and descriptions of new species and subspecies. Am. Midl. Nat. 31:111-149.

Riegel, J. A. 1959. The systematics and distribution of crayfishes in California. Calif. Fish and Game 45(1):29-50.

Stansberry, D. H. 1962. A revised checklist of the crayfish of Ohio (Decapoda: Astacidae). Ohio State Univ. Dept. Zool.and Ent., 5 pp.

Styron, C. E. 1969. Taxonomy of two populations of an aquatic isopod, Lircus fontinalis Raf. Am. Midl. Nat. 82(2): 402-416.

Turner, C. L. 1926. The crayfish of Ohio. Ohio State Univ. Bull., Ohio Biol. Surv. 3(3):145-195.

Williams, A. B. 1954. Speciation and distribution of the crayfishes of the Ozark Plateaus and Ouachita Provines. Kans. Univ. Sci. Bull. 36(12):803-918.

Williams, W. D. 1970. A revision of North American epigean species of Asellus. Smithsonian Contr. to Zool. #49:1-80.

Bryozoa

Bushnell, J. H., Jr. 1965. On the taxonomy and distribution of freshwater Ectoprocta in Michigan, Trans. Amer. Microsc. Soc., Part I. 84(2):231-244, Part II 84(3):339-358, Part III 84(4):529-548.

Rogick, M. D. 1935. Studies of freshwater bryozoa, II. The Bryozoa of Lake Erie. Trans. Amer. Microsc. Soc. 54:245-263.

_____. 1940. Studies on freshwater bryozoa, IX. Additions to New York bryozoa. Trans. Amer. Microsc. Soc. 59:187-204.

_____. 1941. Studies of freshwater bryozoa, X. The occurrence of Plumatella casmiana in North America. Trans. Amer. Microsc. Soc. 60:211-220.

_____. 1943. Studies on freshwater bryozoa, XIII. Additional Plumatella casmiana data. Trans. Amer. Microsc. Soc. 62:265-270.

_____. 1945. Studies on freshwater bryozoa, XV. Hyalinella punctata. growth data. Ohio J. Sci. 45(2):55-79.

_____, and H. Van Der Schalie. 1950. Studies on freshwater bryozoa. XVII. Michigan bryozoa. Ohio J. Sci. 50(3):136-146.

Mollusca

Baker, F. C. 1928. The fresh-water Mollusca of Wisconsin, Wisc. Acad. Sci. Bull. Part I. Gastropoda 70:1-505. Part II. Pelecypoda 70:1-495.

_____. 1945. The Molluscan family Planordidae. The University of Illinois Press, Urbana (Available from University Microfilms).

Call, R. E. 1899. Mollusca of Indiana. Indiana Dept. Geol. Nat. Res. 24th Ann. Rpt: 337-535.

Harman, W. N. and C.O. Berg. 1971. The freshwater snails of Central New York with illustrated keys to the genera and species. Search (Cornell Univ. Agri. Exp. Sta., Ithaca, N.Y.) 1(4):1-68.

Heard, W. H. and J. B. Burch. 1966. Key to the genera of freshwater Pelecypods of Michigan. Mich. Univ. Mus. of Zoo. Circular No. 4:1-14.

LaRacque, A. 1966. Plesitocene Mollusca of Ohio. Ohio Rep and Nat. Res., Columbus, Bull 62(1-4).

Leonard, A. B. 1959. Gastropods in Kansas. Kan. Univ. Dept. Zool. State Biol. Surv. 224 pp.

Murry, H. D. and A. B. Leonard. 1962. Unionid mussels in Kansas. Kan. Univ. Dept. Zool. and State Biol. Surv. No. 28, 104 pp.

Ortmann, A. E. 1919. A monograph of the naiades of Pennsylvania. Part III. Systematic account of the genera and species Memoirs of the Carnegie Museum 8(1):1-383.

Parmalee, P. W. 1967. The freshwater mussels of Illinois. Ill. State Mus. Popular Science Series, Vol. VIII 1-108.

Robertson, I. C. S. and C. L. Blakeslee. 1948. The Mollusca of the Niagara Frontier Region. Bull. Buff. Soc. Nat. Sci. 19(3):1-191.

Sinclair, R. M. and B. G. Isom. 1963. Further studies on the introduced asiatic clam Corbicula in Tennessee. Tennessee Stream Pollution Control Board, Tennessee Department of Public Health, 75 pp.

Starrett, W. C. 1971. A survey of the mussels (Unionidae) of the Illinois River, a polluted stream. Ill. Nat. Hist. Sur. Bull. 30(5):267-403.

Stein, C. B. 1962. Key to the fresh-water mussels (Family Unionidae) of Western Lake Erie. Ohio State Univ., Stone Laboratory, 5 pp.

PLATYHELMINTHES

Turbellaria

Kenk, R. 1953. The fresh-water triclads of Alaska. Proc. Nat. Mus. 103:163-186.

_____. 1969. Freshwater triclads (Turbellaria) of North America. Part I. The genus Planaria. Proc. Biol. Soc. Wash. 82:539-558.

_____. 1970. Freshwater triclads (Turbellaria) of North America. Part II. New or little known species of Phagocata. Proc. Biol. Soc. Wash. 83:13-34.

_____. 1970. Freshwater triclads (Turbellaria) of North America. Part III. Sphalloplana weingartneri, n. sp. from a cave in Indiana

_____. 1970. Freshwater triclads (Turbellaria) of North America. Part IV. The polypharyngeal species of Phagocata. Smithsonian Contr. Zool. 80:1-17.

Minor Taxa

Crowell, R. M. 1960. The taxonomy, distribution, and development stages of Ohio water mites. Bull. Ohio Biol. Surv. 1(2):1-77.

Lange, W. H. 1956. A generic revision of the aquatic moths of North America: (Lepidoptera: Pyralidae,Nymphulinae). Wasmann J. of Bio. 14(1):59-144.

Penny, J. T. and A. A. Racek. 1968. Comprehensive revision of a worldwide collection of freshwater sponges (Porifera: Spongillidae). U.S. Na. Mus. Bull. 272:1-184.

General References

Borror, D. J. 1960. Dictionary of word roots and combining forms. National Press Books, Palo Alto, Calif.

Eddy, S. and A. C. Hodson. 1961. Taxonomic keys to the common animals of the North Central states. 3rd ed. Burgess Publ. Co., Minneapolis, Minn. 162pp.

Edmondson, W. T., Ed. 1959. Ward and Whipple's. Fresh-water biology. John Wiley and Sons, Inc. New York, 1248 pp.

Kuzin, B. S. 1966. Plankton and benthos of inland waters (Translated from Russian by Israel Program for Scientific Translations.) Available from U. S. Dept. Commerce, Springfield, Virginia 22151.

Needham, J. G. and Paul R. Needham. 1962. A guide to the study of fresh-water biology. Holden-Day, Inc. San Francisco.

Parrish, F. K. (Ed.). 1968. Keys to water quality indicative organisms (Southeastern United States). FWPCA, Department of Interior, Atlanta, Georgia.

Pennak, R. W. 1953. Fresh-water invertebrates of the United States. Ronald Press Co., New York. 769.

Petersen, A. 1962. Larvae of insects: An introduction to nearctic species. Parts I & II. Edwards Brothers, Inc., Ann Arbor, MI.

Torre-Bueno, J. R. DeLa. 1962. A glossary of entomology. Brooklyn Ent. Soc., Brooklyn 1, N.Y., 372 pp.

Tuxen, S. L. 1970. Taxonomists glossary of genitalia in insects. Munksgaard, Copenhagen (Available from S. H. Service Agency, Inc., Darien, Conn. 06820.)

Usinger, R. L., Ed. 1963. Aquatic insects of California. Univ. of Claif. Press, Berkeley and Los Angeles, 508 pp.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1972 — 759-548/1029